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What About Electronic Ranges?

Microwave cooking operates on a different principle from that used in conventional cooking. And electronic cooking calls for some different techniques. Here are some facts now known about electronic ranges.

by Helen J. Van Zante

ANY NEW appliance prompts curiosity and many questions. This is particularly true of the electronic range. Not only is it new, but it is different in its principle of heating food.

The questions homemakers and our home economics students ask about the electronic range run something like this: Will it replace my conventional range? Is it safe? Is it practical? How does it work? Could I learn to operate it? What are its electrical requirements? Does food taste the same? Will I have to learn new food preparation methods?

The facts given here are those we now know. Much research still needs to be done both in the equipment and in the food and nutrition field to get at additional practical answers. One thing is certain—the electronic range is here and “at home” in many kitchens now.

Keep Present Range . . .

If you buy an electronic range, you'll no doubt continue to use your conventional range. Most

foods won't brown in the electronic range. Though many electronic ranges on the market have a built-in browning unit, your conventional range broiler can also serve for browning.

Furthermore, some foods are not cooked successfully in the electronic range. These include such foods as yeast breads, pie crusts and angel cakes. Griddling as yet hasn't been successful. And pancakes are tough and unrecognizable as such. So some supplementary cooking equipment will still be needed for this kind of cookery.

New Cooking Principle . . .

The principle by which food is heated in an electronic range is entirely different from the principle on which our conventional equipment is based. You might compare an electronic range to a tiny radio station. There's a magnetron that creates short electromagnetic waves called microwaves. The microwaves are about 5 inches long and are approximately 1/700th the length of ordinary radio waves. Electronic ovens operate on a frequency of 2,450 megacycles (million cycles).

The microwaves are “broadcast” from an antenna in the unit just as from a radio broadcasting station. The waves are then directed to the oven compartment by a wave guide.

The oven walls are metal and don't allow the waves to escape. The waves are distributed more evenly by a stirring fan as the microwaves enter the food and are transformed into heat.

With microwave energy, food is cooked according to time and not according to exterior temperature. So there's no oven thermostat. But the timer on the electronic range is very precise. New ranges have a 35-minute timer, with a wide-range 5-minute interval timer for easy setting of short cooking times.

Cooking time for food is related to mass or amount. If you're cooking in quantity and need to double a recipe, the cooking time is increased by about a third.

Food absorbs the microwaves to a depth of 2½ to 3 inches. A large, solid food, such as a rolled rib roast, is penetrated by microwaves to the usual depth and then must complete cooking to the center by conduction—the method used in the conventional oven. The statement that the electronic range

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"cooks from the inside out" is false. Microwave cooking proceeds "from the outside in."

Safe To Use . . .

The electronic range is quite safe. The oven door is made of perforated metal that allows you to look in during the cooking process. During cooking, steam escapes through these perforations. But the perforations are small enough to prevent the microwaves from escaping.

Whenever the oven door is opened, a switch automatically cuts off the microwaves—thus preventing burning or injury by them. The Underwriters Laboratories require two interlocks on the door for safety, and no waves are produced when the door is opened. If by some unusual circumstance your hand should be exposed to microwaves, you'd withdraw it as quickly as you would from a hot flame.

With electronic cookery there is no danger of burning your hands on hot pans or on hot oven doors. Surprisingly, you can place your hand comfortably anywhere in the electronic oven immediately after the hot food is withdrawn.

Those electronic ranges that have a browning unit built into the microwave ovens have an automatic safety shut-off in the oven. When the browning unit is operating, this device automatically shuts off the unit when the temperature reaches 185° F.

A Time Saver . . .

Speed is the most outstanding cooking feature of the electronic range. The man who comes in from the field late for dinner can have a single freshly baked potato in less than 5 minutes. Such cooking speed also appeals to the woman who is away from home during the day and wants to prepare a quick meal at night. Pre-cooked meals such as TV dinners can be thawed and heated quickly without the usual wait. These foods must be properly packaged in non-metal containers.

Only a single dish of food can be baked at a time. Therefore, foods must be cooked successively

—and this applies to layer cakes, too. Of course, the quantity of one food can be increased with the proper time adjustment. For example, if the man just mentioned wants four potatoes instead of one, then it would take 8 to 12 minutes, depending on the size of the potatoes. The potatoes also will need moving around during the cooking process to get even baking.

A 5-pound rolled rib roast will cook in about 30 minutes. When it comes out of the oven, however, it will continue to cook near the center for perhaps as long as an hour. A large turkey will cook in a seemingly very short time because it's hollow. Protruding wing tips and drumsticks need protection from overcooking by shielding with aluminum foil.

Meal preparation is faster, too, because the cleanup job is done quickly with a sponge. The cool oven walls prevent food splatters and boil-overs from sticking. Since you can use paper safely in an electronic range, a paper towel or waxed paper placed over the cooking food will cut down spattering.

Dishwashing of cooking pans is also simplified because there's no burned-on food.

Food Preparation . . .

The cooking pans and containers used in electronic ranges are different from those used in the conventional oven. Glass, paper, paraffin, china and plastics all transmit the microwaves. Metals reflect them. Cooking containers, therefore, should be made of glass, paper, china, plastic and earthenware. Incidentally, an electronic range will not melt paraffin or chocolate.

Some foods ordinarily cooked on top of your conventional range can also be cooked in the electronic oven. Starch puddings, cream sauces and gravies turn out smooth and nice. The electronic method greatly simplifies their preparation.

Both fresh and frozen fruits and vegetables keep their color when microwave cooked. And they've been found to retain considerable vitamin C. In general, other nutrients—such as thiamine, riboflavin, niacin and amino acids

—are also retained in microwave cooking.

Frozen foods direct from the freezer can be cooked quickly. A large T-bone steak was defrosted in the laboratory by placing it in the electronic range for 90 seconds—45 seconds for each side. Then it stood at room temperature for 20 seconds. This seems to be more satisfactory than other methods of defrosting because it eliminates the problem of spotty defrosting. Steaks defrosted and cooked in one operation were acceptable, however.

Day-old cooked foods can be freshened by reheating in the electronic range. Technique is required to freshen bread in order to prevent toughening.

Macaroni and cooked cereals are likely to boil over unless cold water is used. A cooked breakfast cereal can be boiled for a few seconds, then removed and left standing for thickening. When macaroni and cheese were cooked in a casserole they were poorly blended. However, students in the laboratory liked a casserole of potatoes cooked with milk.

Children like to use the electronic range to cook a wiener right in the bun. But wait before biting into it, or you'll burn your tongue.

The Browning Unit . . .

The food is completely cooked by the microwaves, but most foods won't brown in the electronic range. That's where the browning unit comes in! The browning unit is used to give color and crispness to cooked food. In most electronic ranges it's built into the microwave cooking compartment and is an enclosed unit. One make of range has a separate browning oven.

The electronic range has no insulation, and for this reason the use of the browning unit for broiling without the use of microwaves for cooking is discouraged.

There's a special glass sheet at the top of the range above the browning unit. This glass is made to withstand the intense heat from the browning unit, and at the same time it can transmit the microwaves.

Certain substances and mixtures

—such as salt, nonfat milk solids, glucose, glycine, sodium carbonate and monosodium glutamate—have aided browning when applied to the outside of foods cooked by microwaves if a browning unit wasn't used.

How To Operate . . .

Before putting the food to be cooked into the range, an initial warm-up period of 75 seconds is required. This warm-up period can be compared to the warm-up period of radio tubes. A signal light or bell on the range will indicate when the oven is ready to cook food.

Some electronic ranges have several cooking speeds; others have just one. The operator sets the cooking speed with one dial. On another dial the time is set. The door is closed, and a bell rings when the time is up.

The door can be opened at any time during the cooking operation, and a switch will automatically cut off the microwaves. When the door is closed again, cooking is resumed.

In the equipment laboratory special care is taken to guard against operating the electronic range without a load. A dish of water is always kept in the oven to absorb the waves should the timer be mistakenly turned on. When nothing is in the oven to absorb the waves, they are eventually sent back to the transmitter and will damage the magnetron tube, or else will find a leak and dissipate slowly into the room.

The electronic range doesn't heat up the room, but remains cool during the entire cooking operation.

At present a special recipe file or recipe book comes with each electronic range because the power input isn't standard between makes of electronic ranges. The recipes are adapted for a certain power input.

Unsolved Problems . . .

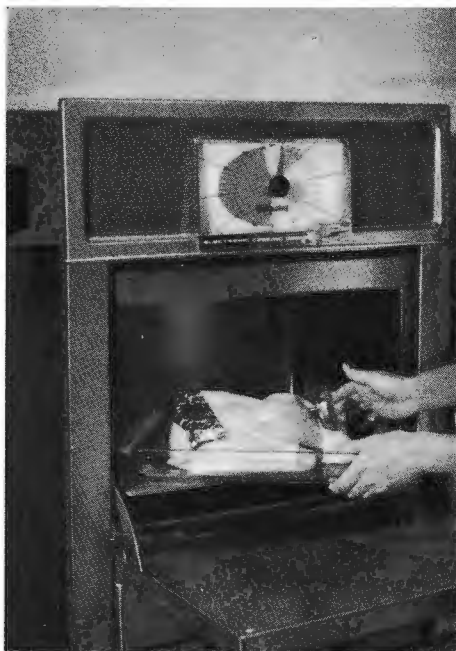
Research in the Household Equipment Laboratory at Iowa State has shown more unevenness of temperature in a cylinder-shaped food cooked electronically than in one baked conventionally.

RIGHT:

Layer cake must be baked one layer at a time, and it won't have the brown crust we expect. But a layer will bake in 5 minutes.

BELOW:

Turkeys will cook in an amazingly short time in the electronic range. Foil protects wing tips and drumsticks from overcooking.



BELOW: This bacon was cooked in seconds in the electronic oven—right on the paper towels shown!



Foods such as hamburger patties or baked potatoes don't cook equally when placed an equal distance from each other.

The problem of exactly when to remove a roast from the electronic oven is complicated because the meat continues to cook while standing.

It's important to remember that the conventional meat thermometer doesn't work properly in the presence of microwaves. In fact, some meat thermometers may be ruined in the electronic oven. For this reason, a thermometer has been specially designed for use in the electronic range.

Installation Data

The electronic range must be installed by an authorized electronic serviceman and calibrated by him according to directions in the service manual.

The electronic range needs 120/240 volt electric circuit similar to the conventional electric range. The power rating is 8.8 KW, whereas the power rating of the average conventional range is 12 KW. The browning unit may use as much as 4,000 watts, or an amount very

similar to the broiling unit in the conventional electric range.

The new electronic ranges are appearing at a reduced price of around \$900. This is approximately \$200 more than the deluxe conventional range.

Upkeep consists of power tube and magnetron replacements. The magnetron is the expensive part. A hermetically sealed self-contained cooling system featured in the new electronic ranges gives longer life to the power tubes.